HYBOND

522/523

WIRE BONDER

MP MASTER
MA28440

INSTRUCTION MANUAL

HYBOND MODEL 523 WITH TOUCH FIRING

HYBOND MODEL 522 WITH MECHANICAL FIRING

S/N _____

Digitized by the Internet Archive
in 2025

https://archive.org/details/manualsplus_09506

SECTION I

INSTALLATION AND SET-UP

1. Unpacking Instructions
2. Initial Set-up and Adjustment
3. A.C. Power-up Procedure
4. Set-up and Adjustment Prior to Operation
   - A. Tool installation
   - B. Tool tuning, without touch firing
   - C. Tool tuning, with touch firing
   - D. Tool level set-up
   - E. Wire clamp gap adjustment
   - F. Tail length adjustment
   - G. Loading the bonding wire with standard inertial wire feed
   - H. E.F.O. set-up

SECTION II

OPERATION

1. Basic Thermosonic Bonding
2. Basic Bonding Cycle
3. Front Panel Controls and Displays
4. Operator Controls
5. Calibrations
6. Starting Parameters

SECTION III

ADJUSTMENTS

1. Mechanical Adjustments
    A. Go switch, without touch firing
    B. Go switch, with touch firing
    C. Flame off switch
    D. Clamp gap
    E. Clamp force
    F. Force solenoid plunger
    G. Tail length system
    H. E.F.O. solenoid stroke
2. Mechanical Adjustments
    A. Touch firing, factory calibration
    B. Display, factory calibration
    C. Temperature control, factory calibration

SECTION IV

THEORY OF OPERATION

1. General
2. Mechanical
3. Electrical

SECTION V

TROUBLE SHOOTING AND MAINTENANCE

1. Possible Start-up Problems

   A. Bond mode/fault indicator lighted

2. Trouble Shooting Bonding Problems

SECTION VI

OPTIONS, SERVICE BULLETINS AND NEWSLETTERS

1. Option-10 Point of Contact Indicator

2. Option-17 Motorized Wire Feeder

3. Option-13 Special Features Included in Hybond Serial No. _____ Model _____ Bonder

SECTION I - INSTALLATION AND SET-UP

1. Unpacking Instructions

   A. Tools required, scissors and carton knife

   B. Set shipping container upright.

   C. Open top of the box. The envelope on the top layer of foam contains the packing list and instruction manual and any special instructions.

   D. Remove top layer of protective foam.

   E. Remove the boxes containing machine accessories.

   F. Before removing the Hybond machine from the container, note the X-Y manipulator handle, the 1.0 inch black plastic knob with a red tag attached. Do not lift by that handle, or bump while lifting the machine free of the container. Applying pressure to the handle may damage the unit.

   G. Do not remove the tagged shipping blocks, screws or tape until the machine is placed on a bench in its final work area.

2. Initial Set-up and Adjustment. The only tool required is a 3/32 allen wrench.

   A. Set the Hybond machines on a work bench and then remove all red tagged shipping blocks, shipping screws and tape.

      All of the above shipping provisions may be removed without any disassembly of the machine, do not remove any of the machine enclosures at this time.

   B. Unpack the boxes containing the matching accessories. Check the contents of these boxes against your packing list.

   C. Assemble the microscope to its mounting arm and attach the illuminator mount. Install the microscope into the optical mount of the bonder and secure with the set screw on the right hand side of the optical mount.

   D. Install the Z lever and secure with screws provided.

   E. Install the illuminator into its mounting ring and plug its cord into the illuminator transformer.

F. The work stage cable is to be run under the left hand side of the bonder and plugged into its mating connector on the rear back bulk head.

G. Plug stitch switch into rear bulk head and place foot switch on floor such that the operator may treadle.

H. Before plugging in any power cord, complete the following procedures:

1. Check the Z lever for freedom of movement. If Z motion is not free, check for remaining shipping blocks or tape. Do not force Z lever.

2. Check the X-Y lever for freedom of movement. If X-Y motion is not free, check for remaining shipping screws, blocks or tape. Do not force X-Y lever.

3. Check microscope position. The desired position is such that the tool, in bond position, is in the center of the field of view. Front to back adjustment may be achieved by adjusting the microscope down stop, which is located between the mounting yoke and the vertical adjustment side. The X axis adjustment is made by swinging the microscope right to left and locking in place with the set screw on the right hand side of the optical mount.

3. A.C. Power-up Procedure

A. Before plugging into the A.C. power source, check the label located above the buckhead on the rear panel. If the label does not agree with the available A.C. power, do not plug in.

B. Also, check the A.C. wall socket for correct wiring. Do not plug in if any of the following conditions exist:

1. Open Ground

2. Open Neutral

3. Open Hot

4. Hot/Ground Reverse

5. Hot/Neutral Reverse

If any of the above exist, call plant maintenance and have corrected before plugging in the bonder.

C. Push the power switch to turn machine on. The following will occur.

1. The power switch will be back lighted.

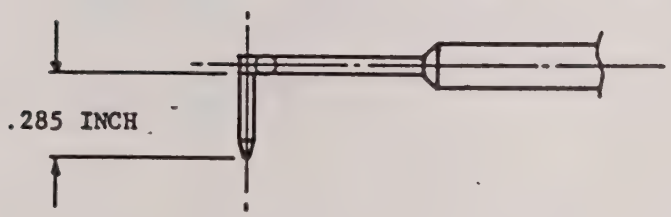
2. The 3 digit L.E.D. display will come on, it will indicate the work stage temperature or, "EEE" if the work stage is not connected.

4. Set-up and adjustment prior to operation. (See Figure 1 for adjustment location)

A. Tool Installation

1. The only recommended tool type is a ceramic 1/16 inch dia X 0.437 long bonding capillary.

2. The bonding tool is fitted into the 1/16 inch diameter hole in the ultrasonic transducer and secured by tightening the special cap screw with a hex key furnished. INITIALLY install the tool as show below.



B. Tool tuning for Model 522 with manual firing.

1. Install tool as described previously and move tool up and down, retighten the locking screw each time, for maximum deflection of the U/S power meter when the test/reset switch is actuated. A properly positioned tool will cause meter deflection of 0.35 to 0.40 milliamperes.

C. Tool tuning, for Model 523 with touch firing.

1. Install and tune tool as described in previous steps for Model 522.

2. Press "CAL" switch, the U/S power meter should read 0.40 milliamperes.

3. Should adjustment be necessary, insert adjustment tool in left side of bonder and adjust "CAL" pot until U/S power meter is 0.40 milliamperes.

D. Tool level set-up

1. Position the workstage holding a workpiece on the work platform, but not under the bonding tool.

2. With the Z lever, lower the tool to its lowest position.

3. The bonder is factory adjusted such that the tool tip is .020 to .030 inch below the work stage surface.

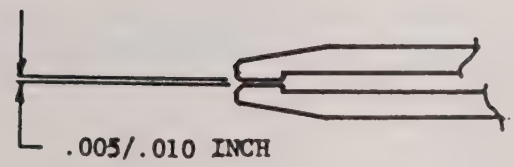
4. Should readjustment be necessary, loosen lock nut on tool level adjustment and turn. C.W. raises the tool and C.C.W. lowers the tool.

There is no lock nut →

E. Wire Clamp Cap Adjustment

1. Check gap of wire clamps. When open, the gap should be 0.005 to 0.010 in., as shown.

2. Cap is adjusted by open position limit screw. See figures 3 and 7.



F. Tail Length Adjustment

1. Turn power on.

2. Cycle through to second bond and note when wire clamps close.

3. Adjust tail length such that clamps close after lifting off second bond such that a .020 tail is left for ball formation. This is accomplished by turning the tail length knob, C.W. for shorter tail and C.C.W. for longer tail.

G. Loading the Bonding Wire. Standard Wire Feed. See Figure 2 for wire feed assembly components.

1. Place spool of gold wire in spool mount.

2. Screw the polished guide plate finger tight.

3. Place the glass wire guide into spool mount.

4. Using a length of small gage wire with a hook on the end, pull the bonding wire through both the wire guide and wire tension tubes.

5. Using tweezers, feed the wire through the final wire guide and through the bonding tool.

6. Hook the tension arm under the bonding wire.

7. Place the protective cover on the spool mount and secure.

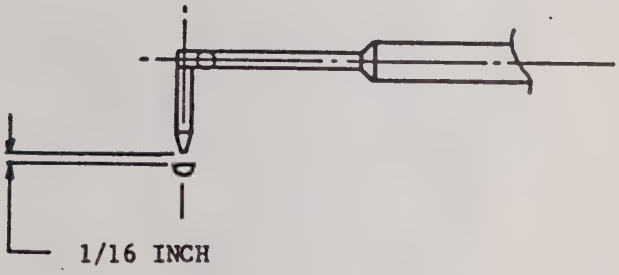
8. Place the drag fiber into the glass tube and adjust the wire drag by moving fiber in or out of the tube.

9. The drag is correct if, when pulling wire through the capillary, the spring tension arm deflects 3/16 in.

H. E.F.O. Set-up

1. Adjust the arc gap between the bonding tool and E.F.O. wand to 1/16 inch. This is accomplished with the E.F.O. Z position knob.

2. While pushing the E.F.O. wand body to its back position, adjust the E.F.O., theta position knob so the centerline of the tool and wand coincide as shown.



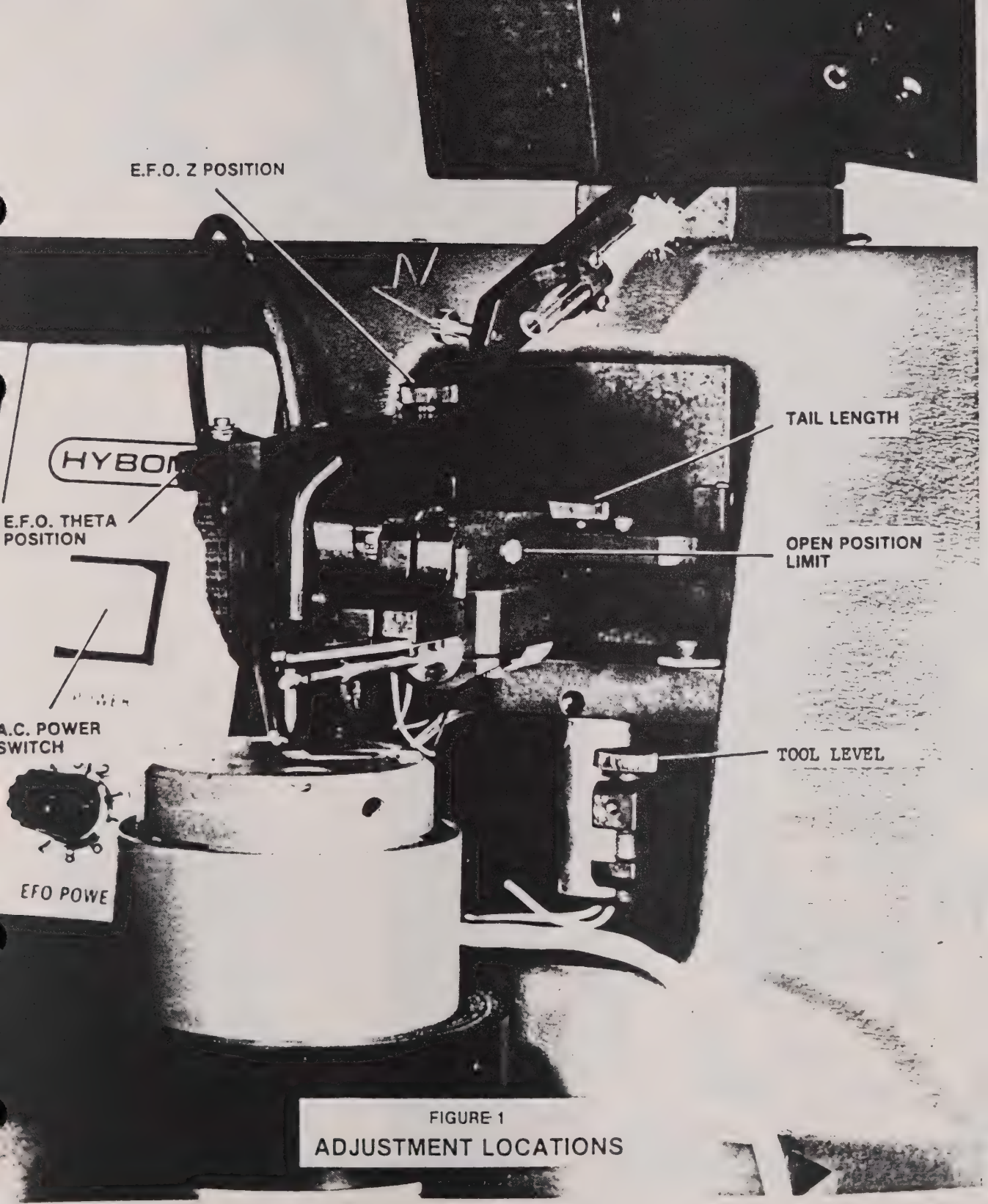


FIGURE 1
ADJUSTMENT LOCATIONS

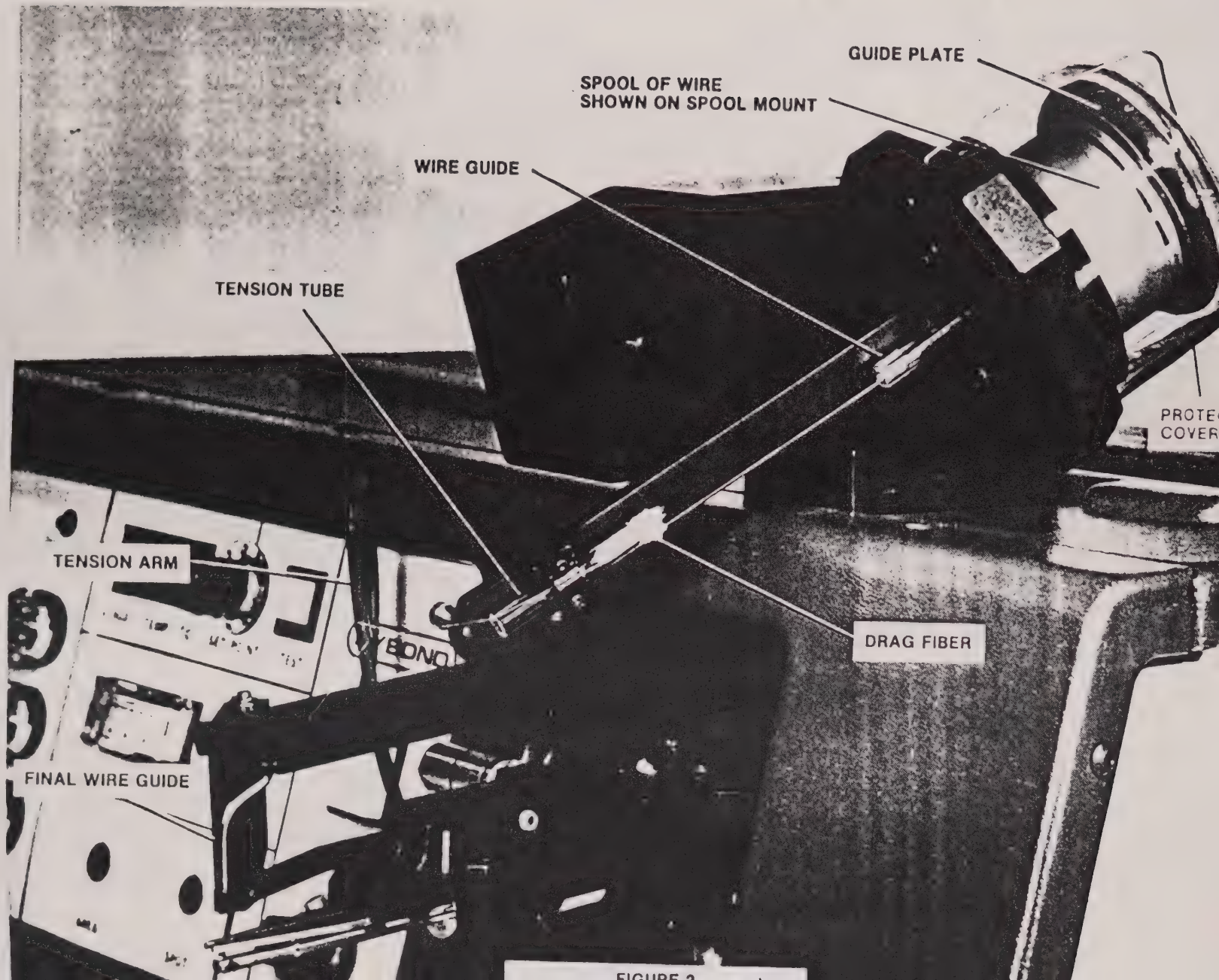

GUIDE PLATE
SPOOL OF WIRE
SHOWN ON SPOOL MOUNT
WIRE GUIDE
TENSION TUBE
TENSION ARM
DRAG FIBER
FINAL WIRE GUIDE

FIGURE 2

1. Basic Thermosonic Bonding

   A. Bonding of two metals using the Thermosonic method results from 4 variables; force, heat, ultrasonic energy and time. Force is introduced to promote plastic flow (deformation) and intimate coupling between the bonding tool, the wire and the substrate. Heat at a low level to eliminate surface contaminants. Ultrasonic (60 KHz) scrubbing displaces surface contaminants and insures metal to metal coupling and time to cause solid state diffusion.

2. Basic Bonding Cycle (See Figure 3)

   A. The bonding mechanism is at the home position (against the upstop). The wire protrudes from the capillary slightly (0.010-0.030 in.) and a ball has been formed on the end of the wire.

   B. The operator lowers the bonding mechanism to a level above the work where the final targeting is performed.

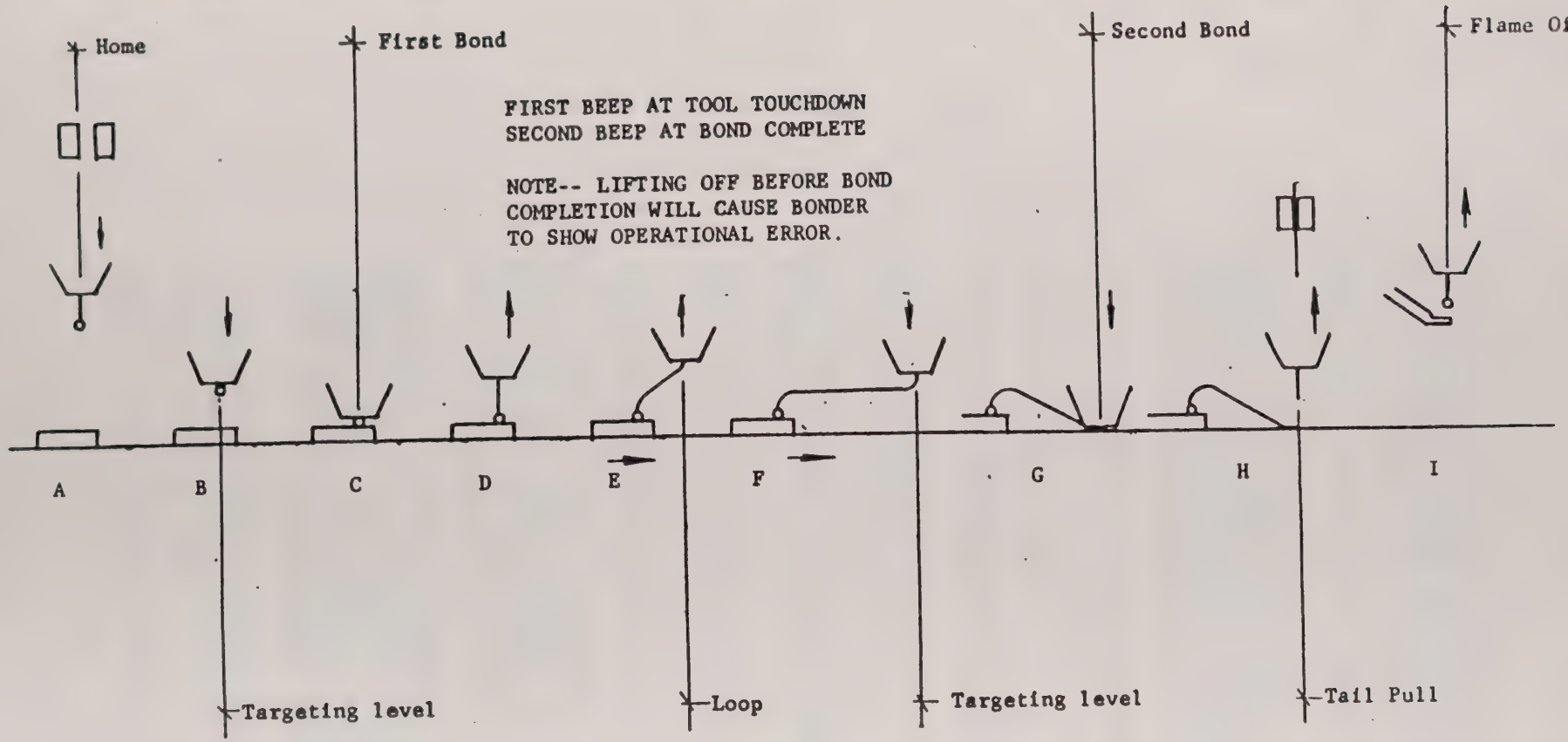
   C. The operator continues lowering the Z lever until the capillary makes contact with the workpiece and force is ramped up to the preset level. All preset bonding variables for the first bond are applied. Contact with the workpiece causes an audible signal (beep) indicating touch down. A second signal (beep) indicates end of bond time.

      NOTE: The first beep is caused by initial tool contact and the second occurs when the front panel controlled bond time is complete. If the operator should raise the tool before the bond is complete (bond time) the bond mode/fault (L.E.D.) indicator will stay on indicating operational fault. If this occurs, press the ultrasonic test/reset switch and restart bonding cycle.

   D. The operator moves the tool upward to form the loop height.

   E. The operator simultaneously moves the work stage in the direction of the second bond site.

   F. The operator lowers the bonding mechanism from loop to the second targeting level and completes final targeting.



HYBOND MODEL 523 BONDING OPERATION SEQUENCE
FIGURE 3

G. The operator continues lowering the Z lever until the capillary makes contact with the workpiece and force is ramped up to the preset level. All the bonding variables for the second bond are applied.

H. After the second signal (beep) the operator starts tool ascent.

I. The operator returns the bond mechanism to home position, the clamps are closed and the tail pulled. As the operator continues the upward stroke of the Z lever the E.F.O. wand will swing under the capillary and an electric discharge will form a new ball.

3. Front Panel Controls and Displays (See figure 4)

A. Power (Switch) applies power to the bonder when the switch is back lighted.

B. E.F.O. power (Potentiometer) controls the discharged electricity which forms the ball.

C. Stage temperature (3 digit L.E.D. display) indicates surface of work stage in C.

D. Set Point (Potentiometer) adjusts temperature set point of heated workstage. Adjustable from ambient to 600 C.

NOTE: The standard work stage supplied with Model 523 bonders is wattage limited to 200 °C.

E. Test (Switch) causes 3 digit L.E.D. display to indicate temperature set point.

F. U/S Power (Meter) indicates relative ultrasonic power during bond times. A poor coupling between tool and work would result in less deflection of this meter. Its use is primarily for test after new tool installation.

G. Test/reset (Switch) causes ultrasonic generator to apply energy to transducer. Used to adjust for maximum meter deflection when installing a new bonding tool. Also resets machine to first bond ready condition, and is used to reset logic when either (K) bond mode/fault indicator is on.

H. T.D. CAL (unmarked switch) used for tuning tool touch down curcuit. Indicates the ultrasonic level present at touch down.

I. Spot (Switch)-Off/On control for targeting spot light.

J. Bond Parameters (Potentiometers) controls bonding variables. U/S-First and second ultrasonic energy levels. Time-First and second bond times, each 360 degrees turn of decadial provides 40 ms bond time. Force-First and second bond force adjustable from 0 to 200 gm.

K. First and second (L.E.D.)-indicates bond mode/fault.

4. Operator Controls (See Figure 5)

A. X-Y Axis Controls-4:1 ratio manipulator that provides 0.9 x 0.9 in. work stage travel.

B. Z Axis Controls-2.5:1 ratio lever system that provides 0.275 in. Z tool travel.

6. Starting Parameters

This section is provided to give the user initial set-up parameters only. Actual parameter values will vary depending on progress and material types as well as exact product requirements.

Bond Wire Size		.7 mil	1.0 mil	1.3 mil
Ultrasonic (Decadial setting)	1st	1.0	2.0	3.0
	2nd	1.0	2.0	3.0
Time (Decadial setting)	1st	1.7	2.5	3.5
	2nd	1.7	3.0	4.5
Force (Decadial setting)	1st	3.0	3.3	3.7
	2nd	3.5	3.7	4.2
Temperature		120 °C	120 °C	120 °C
E.F.O. Power (Dial)		1.0	5.0	7.0
Capillary: .437 Long Ceramic - Wire hole dia		1.0 mil	5.0 mil	7.0 mil

Ultrasonic test power, tool Level (U/S Power meter) 0.3 milliamps to 0.4 milliamperes

Ultrasonic test power, T.D. Level (U/S Power meter) Exactly 0.40 milliamperes

.2 for our special capillary

.2 - .3

US 2.5 3.4

time 2.6 3.0

Force 2.7 3.2

EFO 7-5

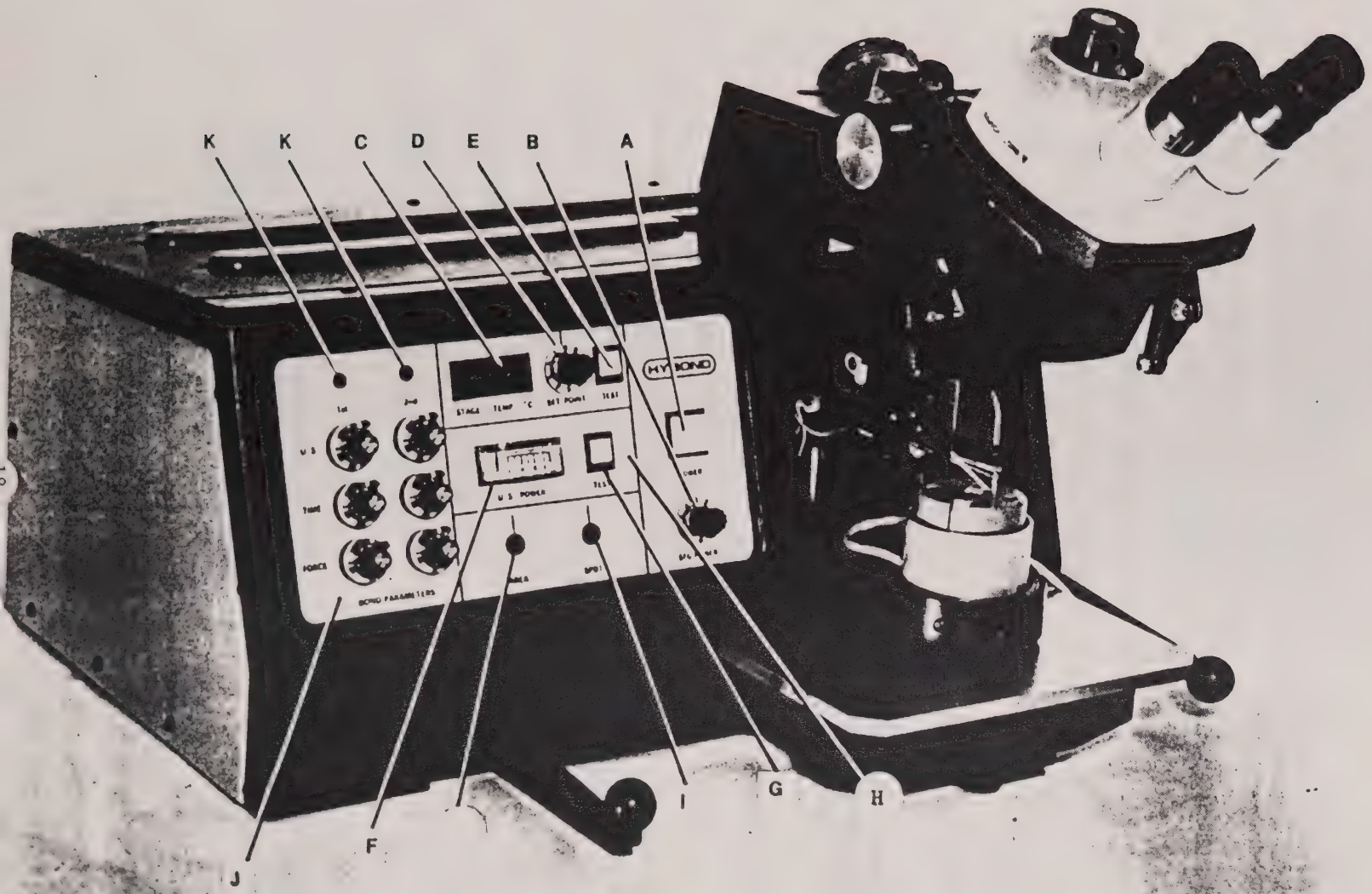


FIGURE 4

FRONT PANEL CONTROLS AND DISPLAYS

SECTION III - ADJUSTMENTS

1. Mechanical Adjustments

HYBOND Bonders are shipped as complete and functioning units. These procedures will be necessary in case a failed component has to be replaced or adjusted.

A. Go Switch Adjustment for Model 523 (manual firing). This switch is to be actuated by Z lever override after the tool contacts the workpiece.

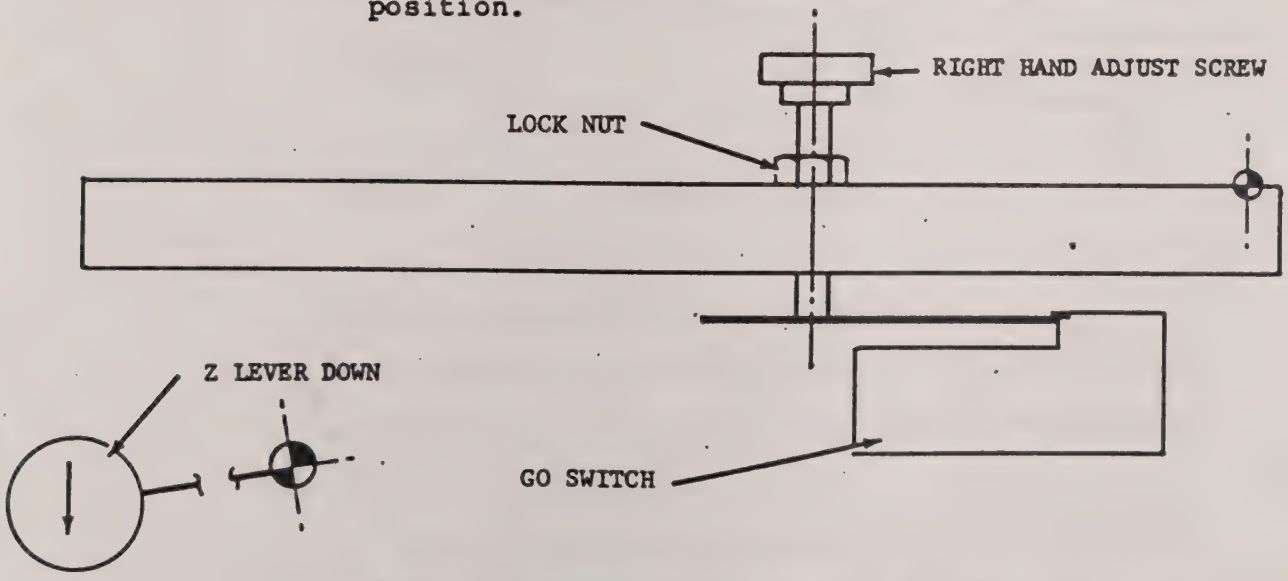
1. Turn adjustment screw C.C.W. several turns

2. Hold Z lever in maximum down position.

3. Turn adjustment screw C.W. until first or second bond indicators turn on.

4. Turn adjustment screw C.C.W. on quarter turn and lock into place.

5. Repeat above steps as necessary. Switch should actuate after the tool contacts the workpiece. But before the Z lever is at maximum down position.



B. Go switch adjustment for Model 523 (touch firing). This switch is used to defeat the touch firing when the bond tool is in its home (up) position. Defeating touch firing at home prevents firing when changing capillaries and treading wire.

1. Turn adjustment screw C.C.W. until side loading the tool causes the machine to fire (listen for the beeps).

2. Turn adjustment screw C.W. until firing stops.

3. Turn adjustment screw C.W. 1 1/2 turns and lock in place.

C. Flame-off Switch

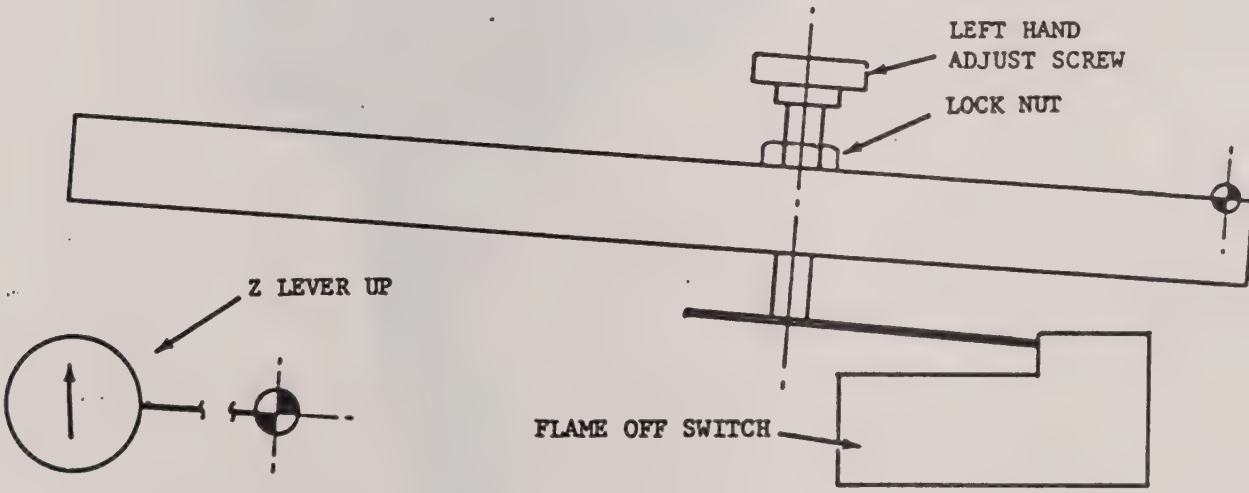
1. Turn adjustment screw C.W. 3 turns

2. Cycle machine through second bond

3. Hold Z lever in maximum up position

4. Turn adjustment C.C.W. until E.F.O. actuates and clamps close.

5. Release Z lever and clamps should open, if not then turn adjustment C.W. to open clamp.



D. Clamp Gap Adjustment (See Section I)

1. Clamp opening should be from 0.005 to 0.010 in.

2. Adjust back position limit screw for proper gap.

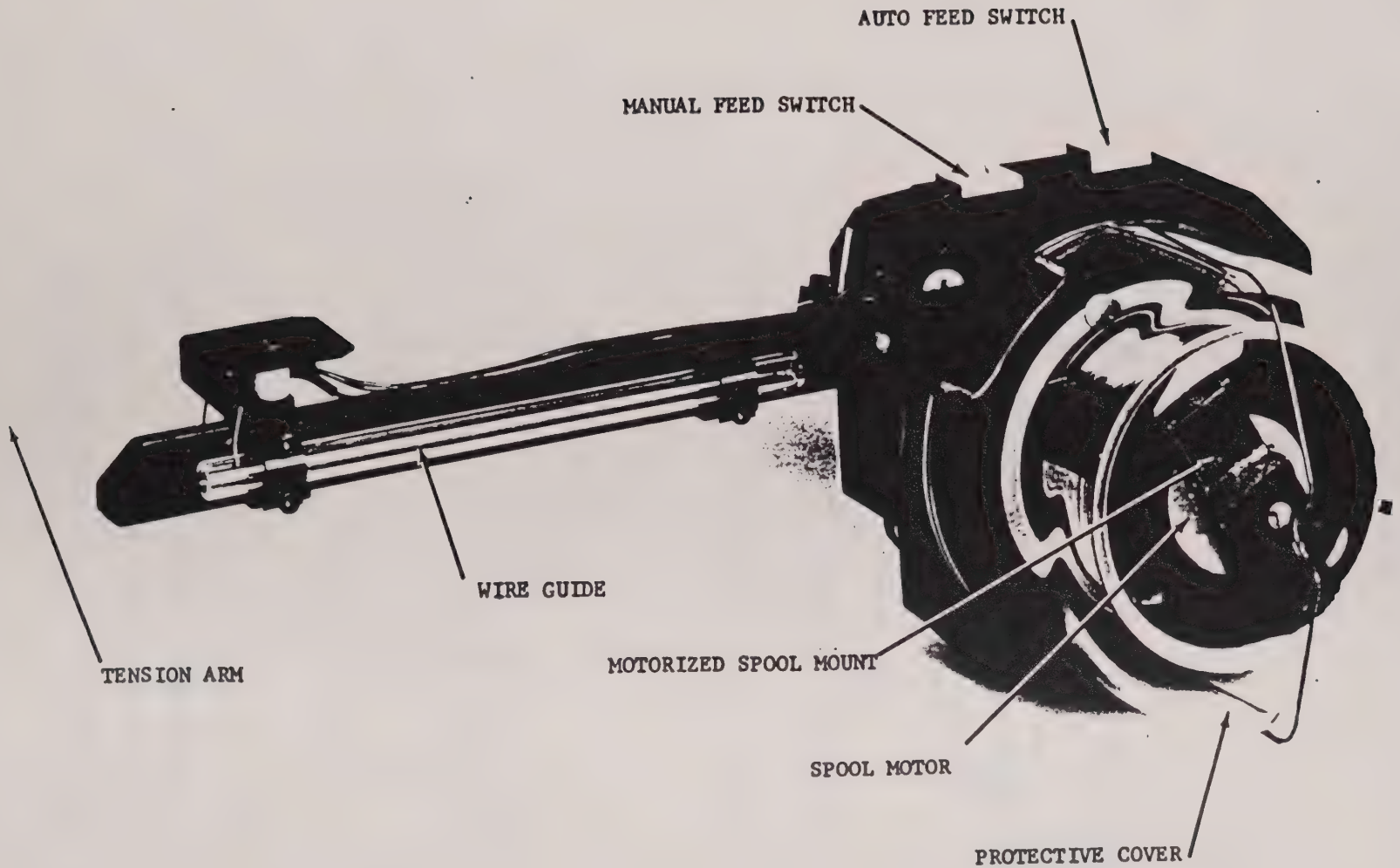
E. Clamp Force Adjustment

1. Proper force of wire clamp is 35 gm to 40 gm.

2. Determine clamp force by measuring grams required to separate clamps, apply force gauge to front of moving clamp blade.

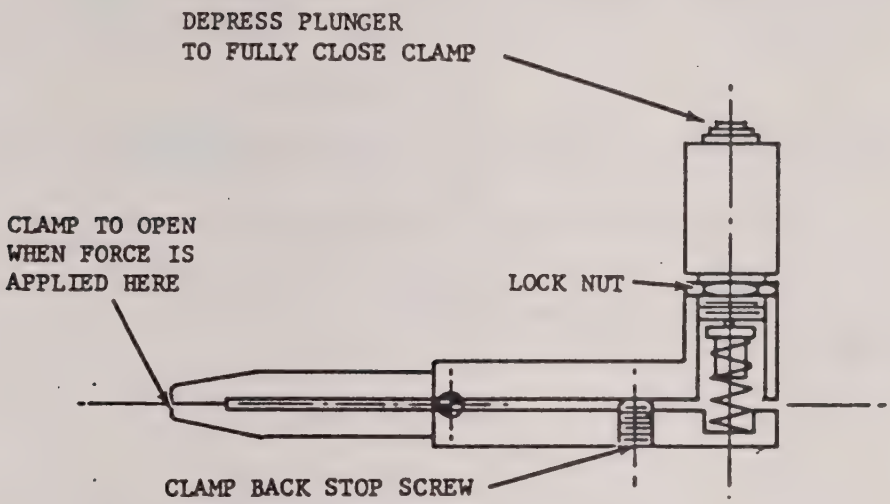
3. Unplug solenoid wires prior to following.

4. Loosen solenoid locknut with a 1/2 inch open end wrench.



OPTION -17
MOTORIZED WIRE FEEDER
FIGURE VI-17.1

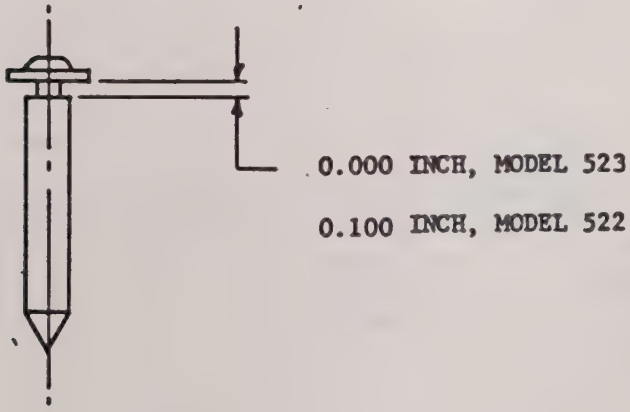
5. Screw solenoid body in to increase clamp force, and out to decrease.



F. Force Solenoid Plunger Adjustment

1. Remove plunger and measure gap between washer and top of plunger.

2. Lock tight or epoxy screw in place after adjustment.



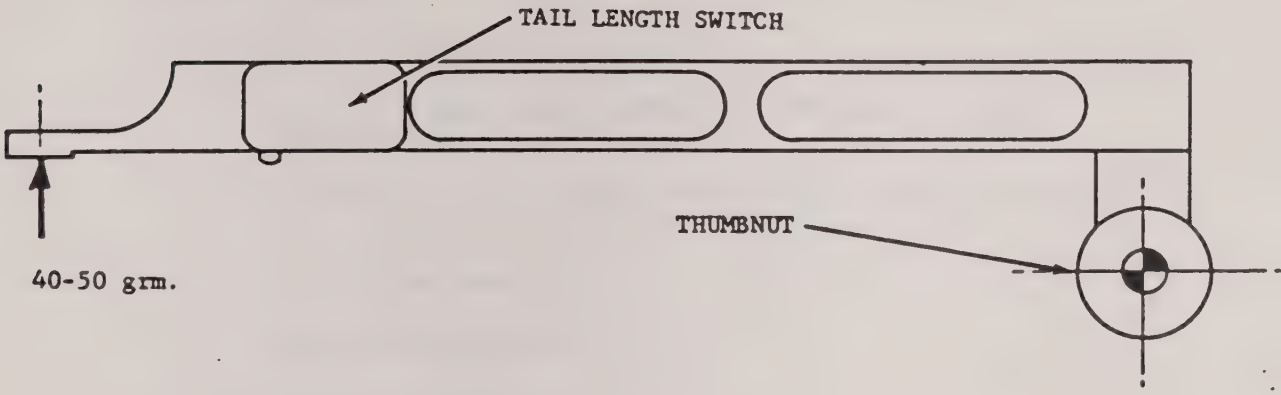
G. Tail Length System Friction Adjustment

1. Remove tail length adjust screw.

2. With a gram gauge apply upwards force at the switch actuator.

3. Starting force to move the arm is 40-50 gm.

4. Adjust thumbnut C.W. to increase force, C.C.W. to decrease.

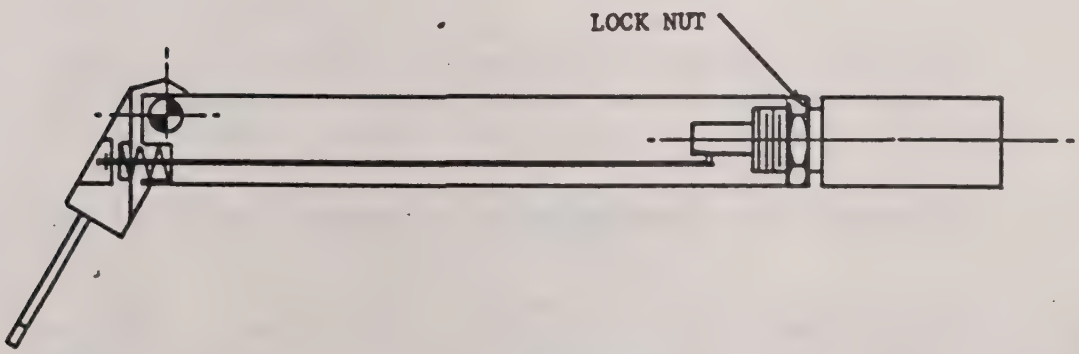


H. E.F.O. Solenoid Stroke Adjustment

1. Unplug solenoid wire.

2. Loosen lock-nut with a 1/2 inch open wrench.

3. Screw solenoid body in or out until proper function is achieved.



2. Electrical Adjustments. The following procedures should only be performed by a Hybond Factory Service Representative or a Factory Trained Service Technician.

These procedures are required only after replacement of a major component, such as a PWA or ultrasonic transducer.

A. Touch Firing (Factory Calibration)

NOTE: It is assumed that a correct tool is installed and properly tuned.

1. Tools and equipment required:

   a. Oscilloscope, dual channel Tektronix 465B or equivalent.

   b. Extender card, 22 pin dual readout edge connector with .156 centers, 7 inch length.

   c. 3/32 Allen wrench.

   d. Pot adjustment tool.

2. Bonder AC power OFF.

3. Remove bonder top cover and PWA retainer.

4. Unplug transducer power leads from P2 of U/S Generator (C5).

5. Unplug U/S Generator PWA (C5) and install on extender card.

6. Turn AC power ON.

7. Connect one channel of O'scope to extender card pin 7 (60 KHZ sample). Set volts/div to .2, time/div to 20 micro seconds.

8. Connect other channel to extender card pin 5 (touch-down). Set volts/div to 5.

9. Observe 60 KHZ sample signal at pin 7 ; should be (S/B) .8VP - P + or - .05V. Adjust the "Level" pot (upper left corner of U/S Generator) as required.

10. Observe the "Touchdown" signal at pin 5, S/B a logic "0" (approx. .2VDC) with no loading on bonding tool. If the signal is a logic "0" proceed to step 11. If signal is a logic "1" (approx. 12 VDC) adjust pot R11 (located on U/S Generator "Piggy Back" board, color gray) CW until signal switches to a logic "0". From this setting continue to turn R11 CW 6 more turns.

11. Adjust the "Level" pot (U/S Gen. upper left corner) CCW until the 60 KHZ sample (pin 7) is .4VP-P+ or - .05V.

12. Observe "Touchdown" signal switches to a logic "1" at this setting. Adjust R11 as required (gray pot on "Piggy Back" board).

13. Return the 60 KHZ sample signal to its proper amplitude of .8VP - P + or - .05V with "Level" pot (U/S Gen. upper left corner).

14. Depress front panel "CAL" switch and adjust "CAL" pot (U/S Gen. Piggy Back board lower left corner) for 0.40 milliamps on U/S Power meter.

15. Turn AC power OFF, return machine to operating configuration.

B. Digital Display (Factory/Field Calibration)

NOTE: This procedure must be performed if repair or replacement of the display board was required.

1. Tools and equipment required:

   a. Test lead (12" minimum)
   b. 3½ or 4½ digit, digital multimeter
   c. Pot adjustment tool
   d. 3/32 Allen wrench

2. Perform the following before proceeding:

   a. AC power OFF.
   b. Remove top cover and PWA retainer.
   c. Unplug one or both temperature controllers (C3 and/or C4) depending on HYBOND model no.
   d. Unplug work stage.

3. Clip test lead between terminals E1 and E6 of display board (E1 = GND, E6 = Analog input).

4. Turn AC power ON and wait 1 minute before proceeding.

5. Check front panel display for "000" and adjust R4 "ZERO" pot as required.

6. Turn AC power OFF and remove test lead.

7. Set multimeter to 10 or 20 volts DC mode and connect leads between E1 (GND) and U1 bottom lead (+5VDC output).

8. Clip test lead between U1 bottom lead and terminal E6.

9. Turn AC power ON and wait 1 minute before proceeding.

10. Observe reading on multimeter and adjust R5 "GAIN" pot as required to make front panel display agree with multimeter's 3 most significant digits. Example: Multimeter reading 5.01 VDC, display should read 501.

11. Turn AC power OFF and return machine to operating configuration.

C. Temperature Control (Factory Calibration)

1. Tools and equipment required:

   a. HYBOND calibration thermocouple assembly
   b. Precision pyrometer
   c. 3/32 Allen wrench
   d. Pot adjustment tool

2. Bonder AC power OFF.

3. Remove bonder top cover and PWA retainer.

4. Unplug the heated work stage from the rear bulkhead and replace with the calibration thermocouple.

5. Bonder AC power ON , wait 1 minute before proceeding.

6. Adjust "S.C. LO" pot such that fron panel display reads "000".

7. Bonder AC power OFF.

8. Disconnect calibration thermocouple and plug in heated work stage.

9. Bonder AC power ON and adjust "Temperature Set-Point" to 150^{o} C. Allow 3-5 min. settling time.

10. Using the precision pyrometer measure, work surface temperature and adjust "S.C. H1" pot such that front panel display reads 150^{o} C.

11. Bonder AC power OFF, return machine to operating configuration.

SECTION IV - THEORY OF OPERATION

1. GENERAL: The model 523 is a realtively simple manual 1.0 mil gold wire bonder intended to make electrical interconnections on a wide range of hybrid microelectronic packages. The design consideration were operator comfort and ease of operation, reliability of the bonding system, low inertia impact of the bonding tool, operator safety and trouble-free operation.

   The operation of a manual bonder requires eye/hand coordination. Due to the minute nature of the work both sight and motion must be magnified, therefore, every effort has been made to place and use the operator's eyes and hands properly.

   Operator safety considerations include: Elimination of potential hazards, sharp edges, dangerous protrusions and finger pinches.

2. MECHANICAL: Model 523 has the following mechanical components: X-Y work position, Z control, bonding platform, tail length control, flame-off assembly, and clamp assembly.

   The work plate in which the heater stage resets is supported on two hardened steel balls in the front and a uniball bearing in the rear allowing freedom of movement in X-Y axes.

   Travel is limited to 0.90 in. square by a nylon jacketed pin which protrudes into a cavity of a frame member. Motion is achieved by a pantograph mechanism which is coupled to the work plate. The manipulator ratio is approximately 4:1, 4.0 in. pantograph travel equals 0.90 in. work travel. The positioning system has a built-in magnetic drag to eliminate overtravel due to the mass of the system. All pivot points with axial loads have sealed ball bearings, other pivots have bronze bearings. All wear points have been provided with hardened pads.

   The Z control is a pivot mounted lever linked to the bonding platform giving a 2.5:1 mechanical reduction in tool motion. This lever also has a built-in Z motion override that is used for actuating the "go" switch when in search and the "flame-off" switch when in the up position after the second bond. The bonding platform is a plate on which the transducer is pivot mounted and counter balanced against, and is the main Z motion component of the mechanism. The plate is rigidly mounted on cone-point pivot bearings and is spring loaded against the up-stop when pressure is removed from the Z lever. The factory only adjusted switch actuators are also carried on this plate.

The tail length is controlled by actuating a switch when bond tool has lifted off the work a preset height. This switch is actuated by the upwards movement of the transducer mount. The switch is mounted on a pivot arm and the gap setting between the transducer mount and this arm controls the tail length. The arm shares the bonding platform pivot axis and is friction loaded to stay wherever it's placed. The wire clamps are activated when the transducer mount ascends to the present switch level. The clamps are solenoid operated and have a clamping force up to 50 grams, which is required for clamping and pulling the wire. The solenoid is a push type which drives against a spring which in turn pushes the clamp blade. The solenoid pushing the spring, not the available solenoid force, established the clamping force.

The X-Y and Z controls are placed to allow both right and left hands to grip controls between the thumb and index finger with the heel of both hands resting on the bench top. This is the same natural position as holding a writing pen.

The microscope is placed so the operator's eyes are properly 16.25 in. above the workbench. This allows the operator's arm to be parallel with and resting on the workbench which provides bracing for the back. This also insures knee and leg clearance under the workbench.

For ease of operation, X,Y, and Z control ratios were carefully selected. The first and second bond indicators and work stage temperature display are placed to be visible during operation without head movement. The microscope is mounted on a 17° angle making targeting much easier and more accurate. All necessary mechanical adjustments are made from the front panel. None of the adjustments, mechanical or electrical, are interacting. Reliability of the bonding system is achieved through design practices and selection of quality components, materials and sub-systems.

HYBOND's exclusive bond forces generator allows bonds to be made with very low impact force, eliminating the problems related to high inertial tool impact. Typically, the problems were chip cratering or metalization damage, tool bounce causing uncoupling of tool and wire during bond times. HYBOND force generator pulls the loaded transducer into the work and applies force to the preset level over a time period. Only after force is established, is the ultrasonic energy applied for the specified time.

3. ELECTRICAL - The major components of the electrical system are the A.C. power distribution, the D.C. power supply, the machine logic (P.W.A.), the force generator (P.W.A.), the temperature control (P.W.A.), front panel

controls and switches, front panel display (P.W.A.), and the sequence switches.

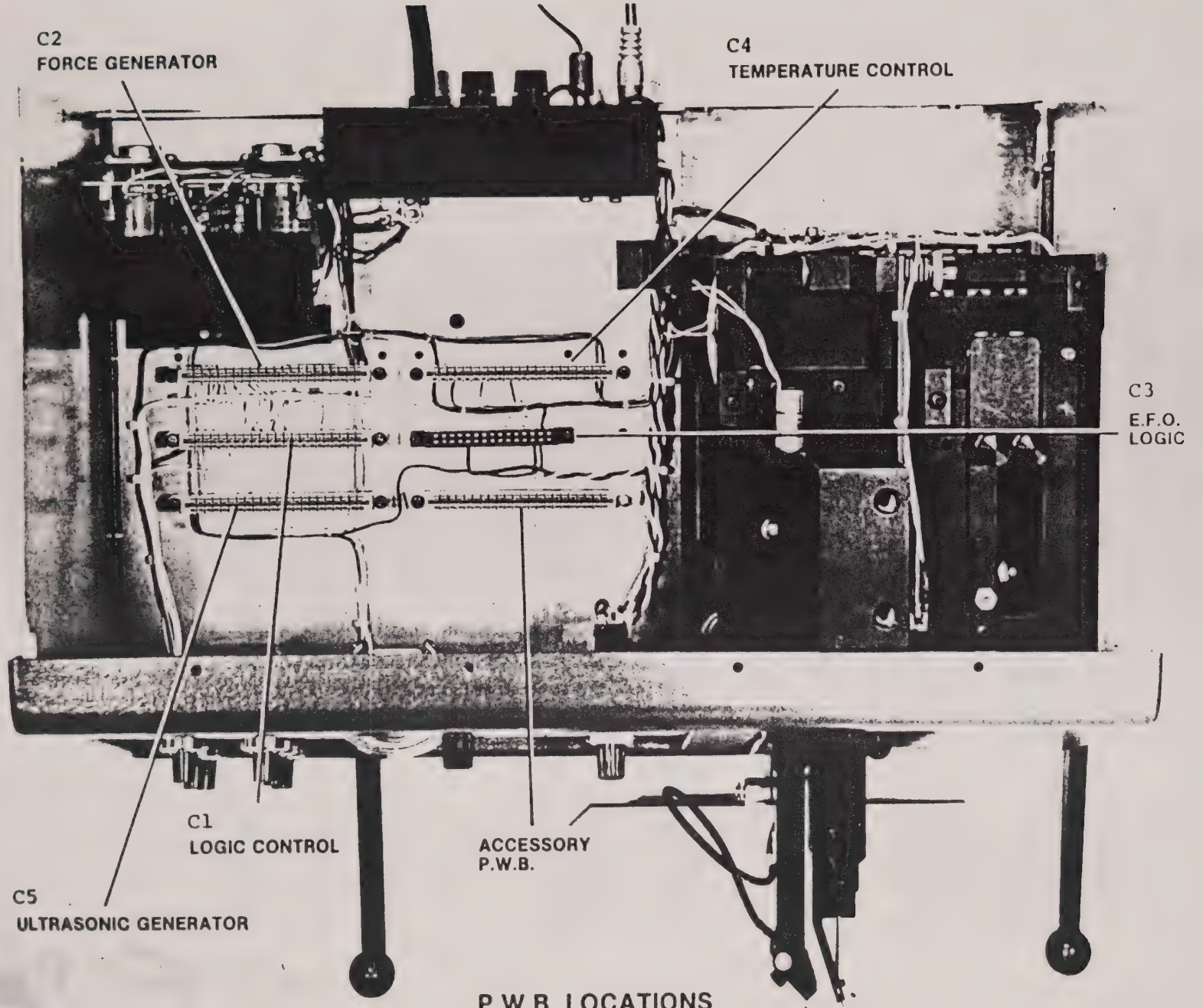
The A.C. power is brought to the bonder by the rear bulkhead mounted line cord routed to the front panel power switch and back to the fuse holder on the rear bulkhead. There are two fuses in series; the first protects the 10 amp's for the temperature control and lamps. The second fuse is to 1.5 amp's for the D.S. power supply and logic controls. The D.C. power supply provides regulated +12 V.D.C., -12 V.D.C. and unregulated +24 V.D.C. to each printed wiring board connector on commonly numbered pins.

The logic circuit contains a power-up reset circuit to provide a proper start point, as well as all other control functions.

The GO switch provides an active high signal to the logic circuit where it is buffered and pulsed. This pulse then changes Q1, Q2, Q3, or Q4 output of the shift register to an active high which sets up the proper inhibits and enables for the respective position on the register. The inhibits and enables provide signals for properly sequenced first and second bond times, ultrasonic energy, bond force, flame off and clamp operation.

The force generator provides current to affect the bond force. On signal from the logic circuit, the current is provided to the force solenoid in a ramped fashion until the preset level is reached. At this level the power is held until the bond time is over. The force level is preset by the front panel controls.

The ultrasonic generator provides power, at a level set on front panel, to the transducer at 60 KHz (See Section II). A phase loop lock system is also provided to insure workpiece coupling.



P.W.B. LOCATIONS

SECTION V - TROUBLE SHOOTING AND MAINTENANCE

1. Possible Start-up Problems

   A. First or second bond mode/fault indicator lighted.

      Hybond Bonders are equiped with an operator pace and bond fault system. If the operator lifts off the bond before the bond time is complete, the bond mode/fault indicator will light.

      This condition indicates potentially incomplete bonds. If the bond force, and ultrasonic energy are removed before the bond time is complete, then it is possible that the bond is not complete.

      Rough or erratic operation of the Z lever will also cause the mode/fault indicator to light.

   B. Determine and use minimum first and second bond times.

   C. Install a dummy workpiece and have operator practice machine operation until proficient, remembering a smooth Z lever operation is required.

   D. The bonding process is possible because of four variables, heat, U/S energy force, and time. Lifting of the bond early terminates the U/S energy and force and will cause an inherent problem.

2. Trouble Shooting Bonding Problems

   A. Bonds not sticking

      1. Contaminated workpiece

      2. Defective, worn or dirty bonding tool

      3. Skidding workpiece due too loose or inadequate clamping

      4. Bonding to downwards slope of substrate metalization such that the tool touches work but wire does not.

      5. One or any combination of the following:

         a. Force too low

         b. Time too short

         c. Ultrasonics too low

d. Temperature too high or low

6. Poor quality bond pads and metalization is lifting off chip or substrate,

7. Tool not square to workpiece

3. No tail after second bond (wire stuck in wire hole of bond tool)

A. Overbonding at second bond due to one or any combination of the following:

1. Force too high

2. Time too long

3. Ultrasonics too high

4. Temperature too high

B. Dirty bonding tool

C. Bonding on downwards slope of substrate metalization such that only wire touches the work, applying excessive force.

D. Loose workpiece

E. Tail length system friction adjustment incorrect.

4. Not pulling tail after second bond (wire still attached to work piece)

A. Clamps not closing, tail length adjustment incorrect.

B. Clamps closing but wire slipping through clamps, clamp force adjustment incorrect.

C. Clamp surfaces contaminated

D. Clamp surfaces not parallel due to damaged clamp assembly

5. Ball not forming on end of tail.

A. Tail length too short or no tail.

B. Tail length too long, will cause electrode to short to wire.

C. E.F.O. power set too low.

D. E.F.O. gap too small or too large.

E. High tension cable disconnected.

F. E.F.O. wand not centered under tool during flame off operation.

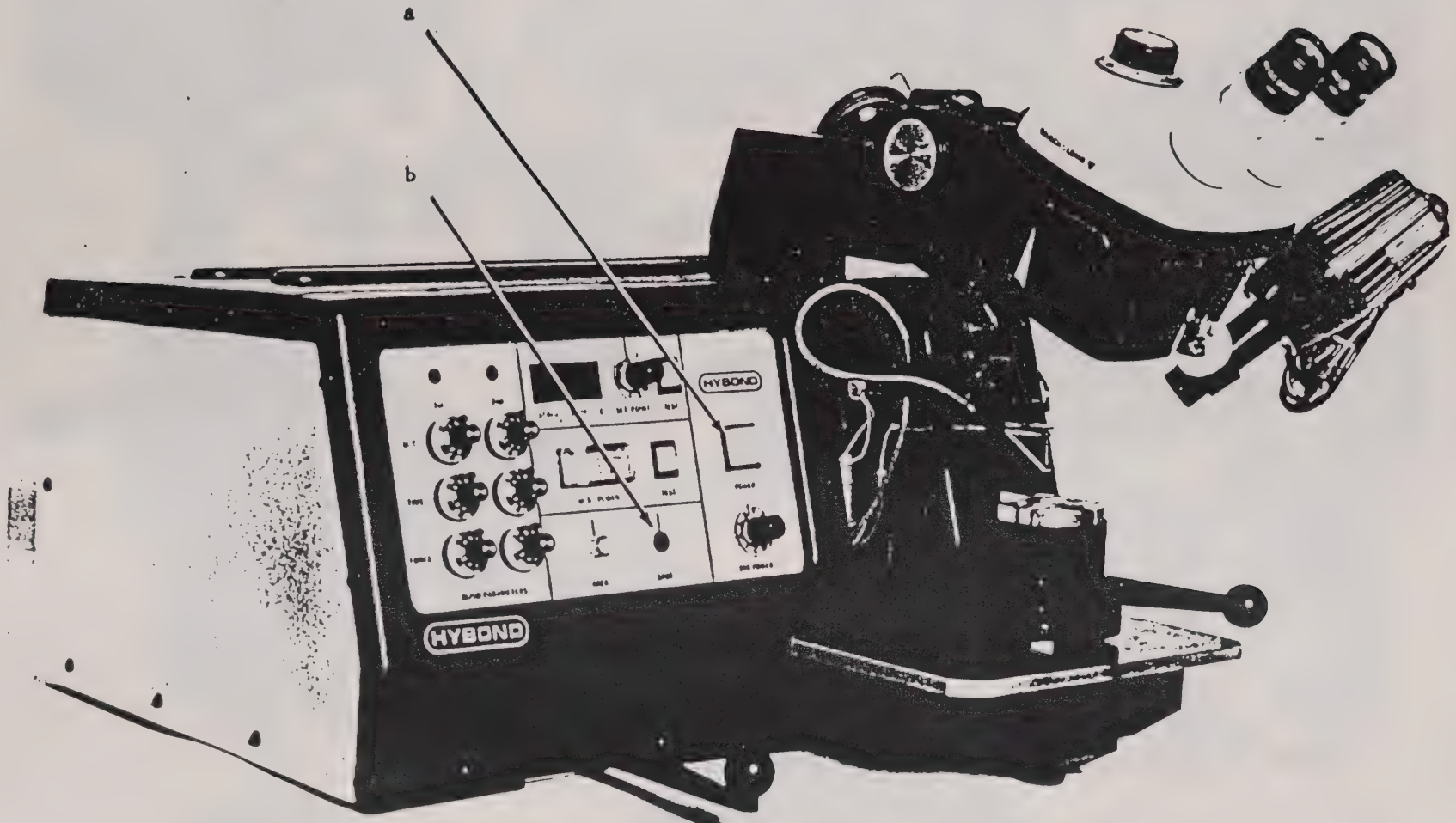
G. Clamps dirty (no ground).

H. Flame off wand not actuating due to flame off switch incorrect adjustment.

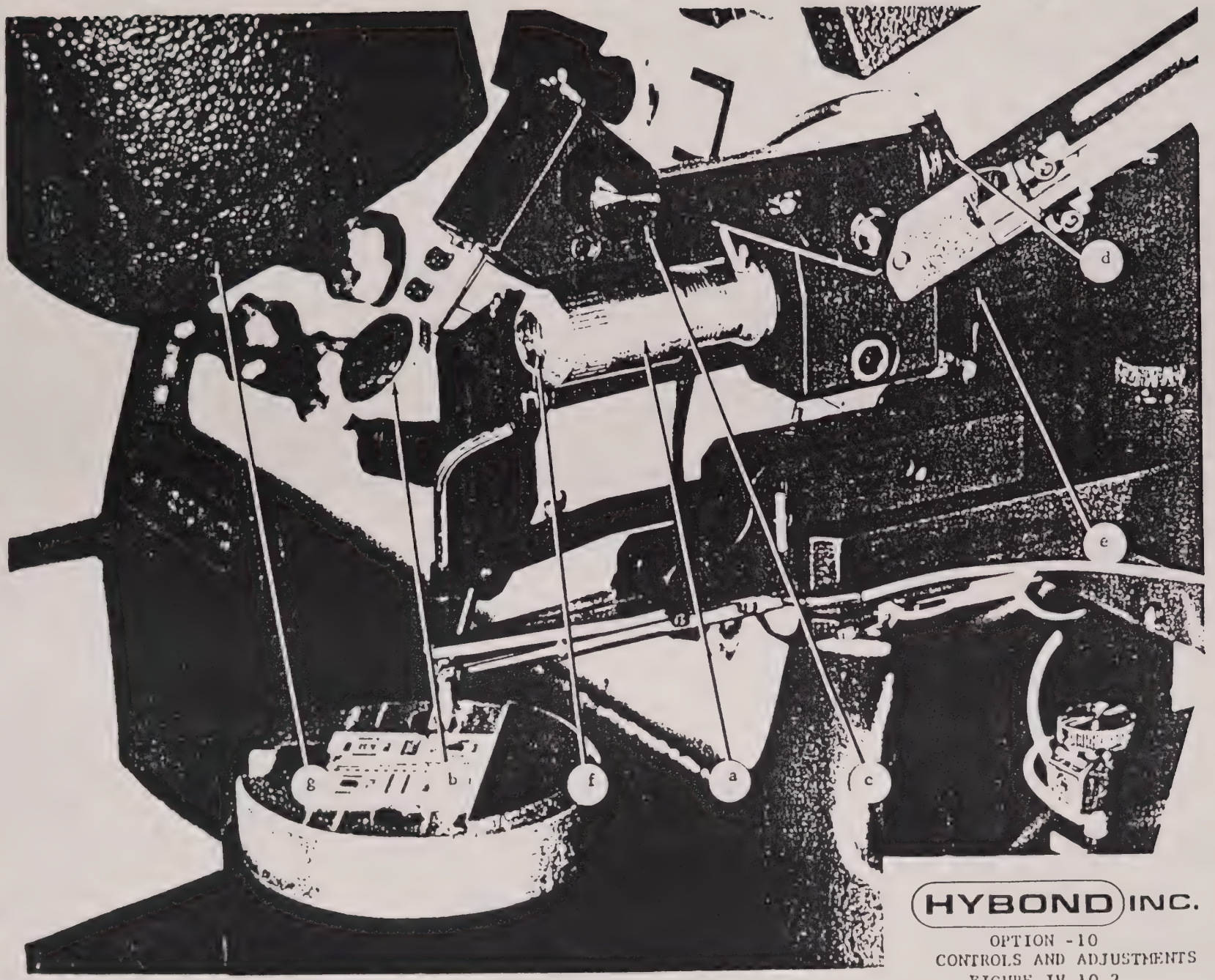
6. Capillary Constantly Plugs

A. Over bonding due to excessive heat, force, ultrasonic energy or time. Excessive parameter levels will cause excessive penetration and jam the bonding wire and substrate material into the bonding tool.

B. Bonding materials. Certain types of substrate metalization requires special set-up parameters and/or special bonder accessories. Please consult factory.

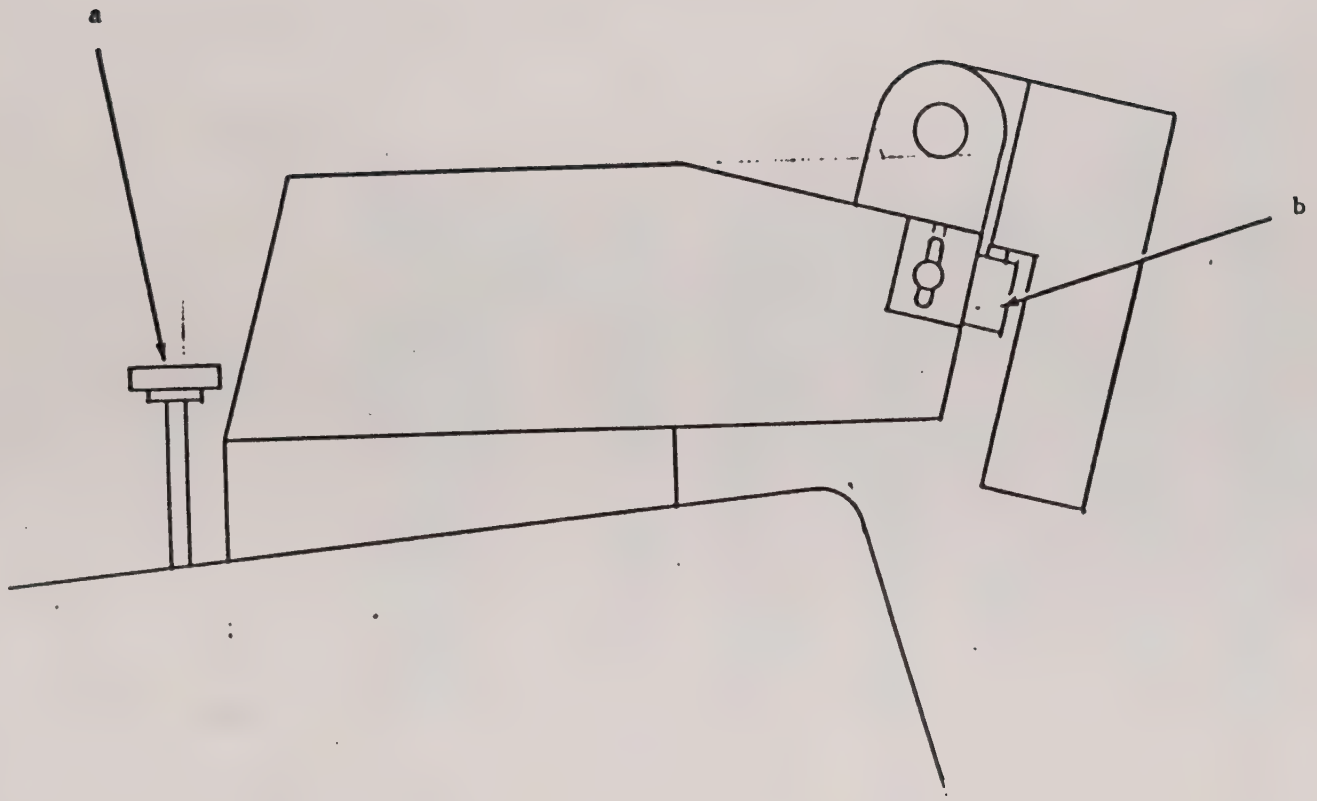


OPTION-10
CONTROLS AND ADJUSTMENTS
FIGURE IV 10.1



HYBOND INC.

OPTION -10
CONTROLS AND ADJUSTMENTS
FIGURE IV 10.2



OPTION-10
CONTROLS AND ADJUSTMENTS
FIGURE IV 10.3

SECTION VI - Options, Service Bulletins and Newsletters.

1. Option - 17 -Motorized wire feeder.

The motorized wire feeder is designed to advance bonding wire on demand and to maintain a constant tension on the wire.

A. Loading the bonding wire. Option -17 motorized wire feeder. See figure VI -17.1

1. Place spool of gold wire in spool mount.

2. Push manual feed button to unwind a length of wire.

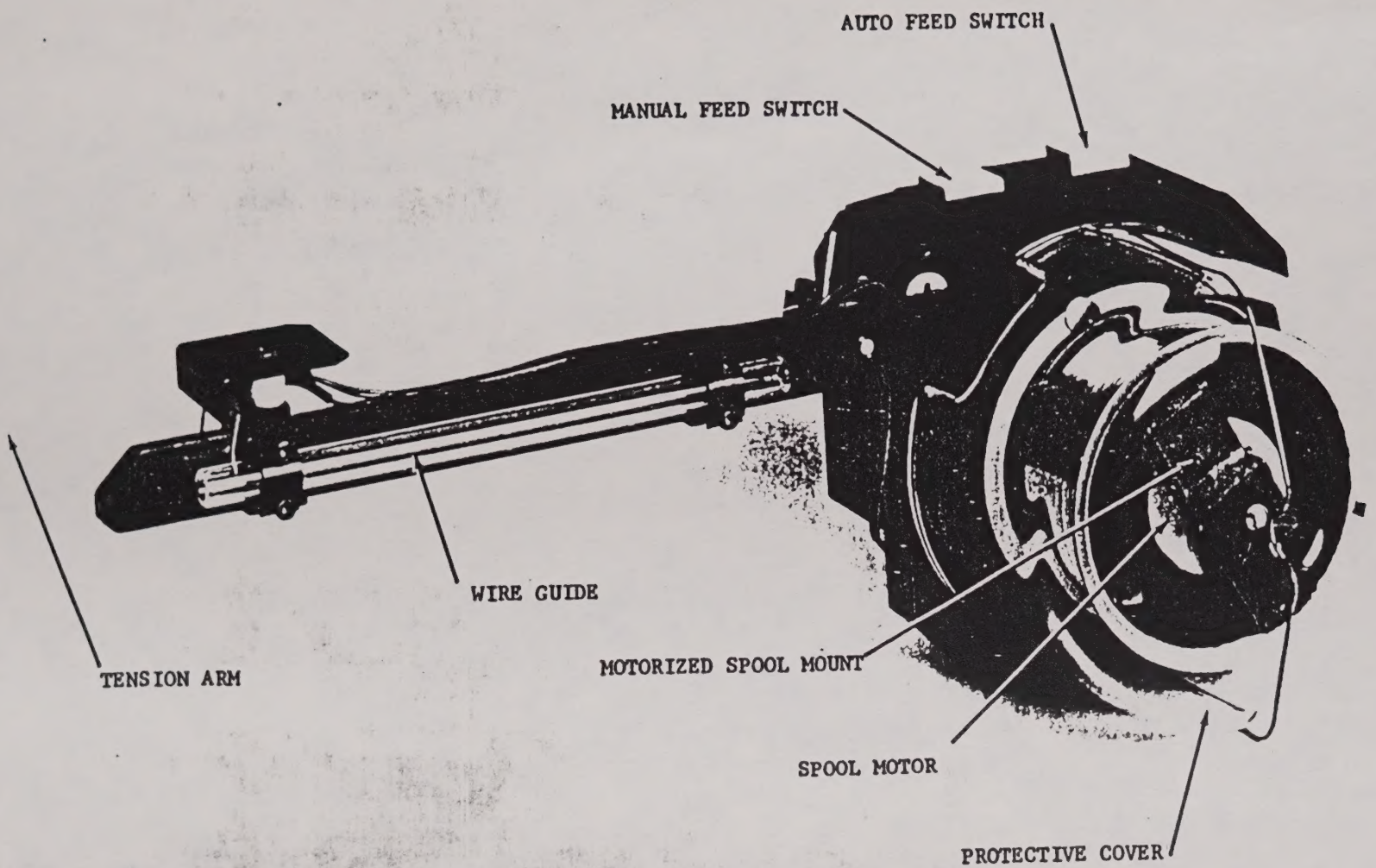
3. Using a length of small gage connection wire with a hook formed on a strip, pull the bonding wire through the wire guide.

4. Hook the wire into the tension arm and push the auto feed button, a red L.E.D. will light. When the wire is pulled out and down, the tension arm will deflect causing the spool motor to run.

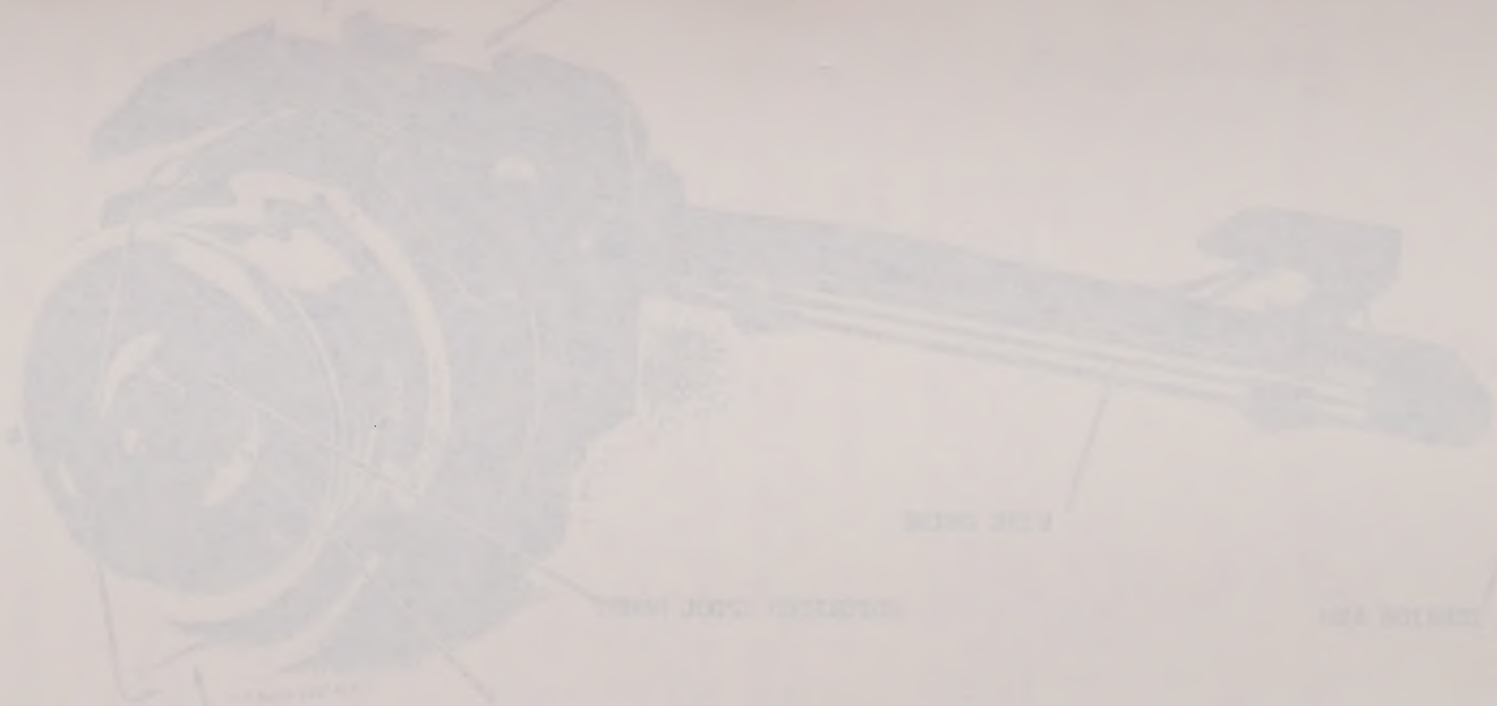
5. Using tweezers, feed the wire through the final wire guide and through the bonding tool.

6. Place the protective cover on the mount and secure.

7. Place the drag fiber into the final wire guide. Turn off the auto feed switch and adjust drag such that pulling the bonding wire through the system causes the tension arm to deflect .125 inch.



OPTION -17
MOTORIZED WIRE FEEDER
FIGURE VI-17.1



MP MASTER
MA28440